

*Experiments to determine the Difference in the Number of Vibrations made by an Invariable Pendulum in the Royal Observatory at Greenwich, and in the House in London in which Captain Kater's Experiments were made. By Captain Edward Sabine, of the Royal Artillery, Sec. R.S. Communicated by the President and Council. Read December 11, 1828. [Phil. Trans. 1829, p. 83.]*

The experiments of which an account is given in this paper, were made in compliance with a request of the Council of the Royal Society, made in December 1827, that Captain Sabine would ascertain the difference in the number of vibrations of a pendulum at Mr. Browne's house, and at the Greenwich Observatory. The author gives a description of the instruments used in the observations; the first series of which were made in Mr. Browne's house, from the 17th to the 20th of March inclusive, and gave as the mean result, 85963·60 vibrations in a mean solar day. A reduction is here introduced, derived from some experiments made on the difference which takes place in the times of vibration in vacuo and in air; the number of vibrations in the former case being, under the same circumstances as in the observations, 9·97 *per diem* less than in the latter. A corresponding series made at Greenwich in May, gave as the mean 85964·17 vibrations, thus indicating an acceleration of 0·57 vibrations *per diem*; but the difference of latitude and of height between the two stations would have led us from theory to expect a total retardation of 0·38 vibration in the same time. From a second set of observations at Greenwich, the diurnal acceleration appeared to be 0·52 vibration. Taking the mean of this and the former result, it appears that the total amount of the discordance between theory and experiment is 0·91 vibration *per diem*. The stations are conveniently situated for verifying the existence of this anomaly, and its magnitude is such as to preclude all uncertainty as to its existence. With regard to its cause, the author is confirmed in the opinions he formerly entertained on this subject.

Tables are subjoined, containing accounts of the rate of the clocks used at both stations, and of the particulars of each series of observations.

*On a definite Arrangement, and Order of the Appearance and Progress, of the Aurora Borealis; and on its Height above the Surface of the Earth. In a Letter to Davies Gilbert, Esq. M.P. P.R.S. By the Rev. James Farquharson, Minister of the Parish of Allford, Aberdeenshire. Read January 22, and February 29, 1829. [Phil. Trans. 1829, p. 103.]*

The results of the numerous observations of the author on the Aurora Borealis, which on several occasions were made under very favourable circumstances, had already been announced in a short paper, published in 1823 in the Edinburgh Philosophical Journal; and it was concluded from them that the Aurora Borealis has in all cases a determinate arrangement and figure, and follows an invariable